

Chapter Ten

The Information and Communication Technology Cluster, 2001

Presently, the Information and Communication Technology (ICT) is one of, if not the main driver of economic development and globalization. It is increasingly gaining weight as an economic tool to enhance productivity as well as value added, through its input to the development of a knowledge-based economy, and improving educational output. Hence, Jordan has currently embarked on a nationwide program to develop, improve and update the ICT cluster to be internationally competitive and assume a leading role in the region.

According to the GCR, one sub factor, otherwise known as the technology sub factor, had a negative impact on the overall performance and ranking of Jordan for the year 2000. Box (10.1) presents the ranking of Jordan in technology related indicators relative to 75 other countries.

Unfortunately, all measures recommended for the improvement and upgrading of the ICT cluster are usually implemented at a slower pace than expected, negatively affecting the progress of the cluster in terms of competitiveness.

Box 10.1: IT Related Indicators (GCR 2001-2002)

- Government Prioritization of ICT	(7/ 75)
- Government Success in ICT Promotion	(9/ 75)
- Legal Framework for ICT Development	(31/ 75)
- Quality of Competition in ISP Sector	(31/ 75)
- Speed and Cost of Internet Access	(34/ 75)
- Quality of Competition in Telecom. Sector	(35/ 75)
- IT Training and Education	(37/ 75)
- Laws Related to ICT Use	(37/ 75)

In brief, understanding the role to be played by this particular cluster in economic development, in addition to the findings included in the GCR vis-à-vis the ranking of the Jordanian technology sub factor drove the JNCT to analyze the ITC segment and the effect supporting industries have on it.

Box 10.2: Survey Sample and Preliminary Data

To begin with, all analysis of the ICT cluster business environment in Jordan is based on a field survey conducted by the JNCT. The sample includes:

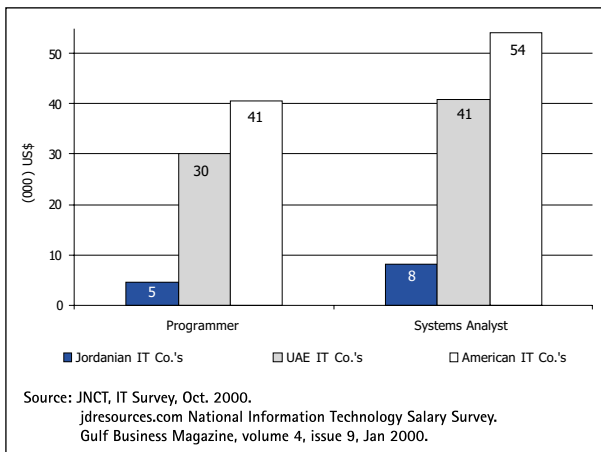
- 17 universities representing 100% of the population. 9 universities are public while the remainder are private. All 17 universities offer 33 different IT related specialties.
- 52 government institutions out of 85. From the surveyed sample, 8% are not connected to the Internet, 65% of the connected institutions restrict the Internet service to a limited number of employees, while only 35% of the connected institutions provide the Internet service to all employees.
- 18 Internet Cafés, which are only 6% of the total number of cafes offering access to the Internet. The total number of Internet Cafés is 285. Today, they are widely distributed in the major cities of Jordan and the service is mainly used for emailing and chatting.
- From a total of 415 registered IT companies, a sample of 107 (26%) was taken. The studied sample of IT companies was randomly chosen according to the type of business and size of company based on the number of employees. From the 107 companies 70 are small sized companies (66%), 27 are medium sized companies (25%) and 10 are large sized companies (9%).

Analysis

A particularity of the IT sector in Jordan is the fact that 66% of the IT company sample under study is made up of small sized companies, whereby all sampled companies are specialized in 3 fields on average. Most commonly, these companies are involved in software development and IT consultancy, and as such are primarily concerned with Internet solutions.

Furthermore, in 1999 local sales reached US\$ 69 million in Jordan, representing 53% of the total sales for that year, whereas in Israel, for instance, the local sales came up to US\$ 1 billion for the same year. This is a strong indicator that the demand is quite limited and unsophisticated in Jordan. As a result the Jordanian IT market continues to be governed by price regulated competition.

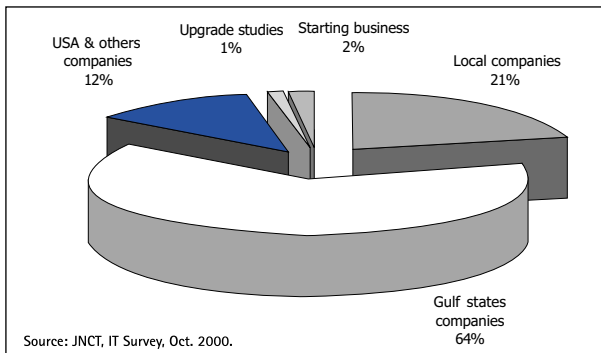
Figure 10.1: Comparisons of IT Wages



Consequently, to reduce costs and remain price competitive in the market, companies maintain a low wage scale. Figure (10.1) provides a comparison between the yearly average starting salary of programmers and system analysts employed in Jordanian IT companies and the same category of salaries in UAE and American IT companies. The evident gap between the wage scale practiced in the Jordanian IT sector and that of other countries, such as the UAE, represents the key factor of the relatively high annual rate of employee turnover at 19%.

Out of the 19% annual rate of employee turnover, 64% move to the Gulf whereby just 21% continue to work for local companies as illustrated in figure (10.2). Accordingly, local IT companies have lost confidence in the benefits of investing in personnel training. Instead, occasional training is being conducted. Nevertheless such training is restricted to a limited number of employees who are mainly from the top management level. The current state of affairs has in turn reinforced the concept of imitation in most companies operating in this cluster. In other words, local production is currently based on imitation and copying of products already available in the market rather than innovation. Furthermore, the

Figure 10.2: Breakdown of Employment Turnover



adoption of such a company philosophy has stifled other IT related initiatives, and supporting activities like IT parks for instance. The meager number of incubators in the field is also a result of the above-mentioned state of affairs in the IT sector in Jordan.

Israel on the other hand, has invested more than US\$ 150 million since 1991, in a national network of technology incubators. In 1997, 338 projects left the incubators and 187 projects (55%) continued to operate while the remainder failed. However, out of the 187 projects that continued, 134 projects (44%) succeeded in attracting additional finance; a cumulated total investment of more than US\$ 85 million and accumulated sales worth US\$ 40 million. Currently there are 200 projects under incubation employing 750 people in Israel.

In Jordan there are presently only two incubators, each of which handles several projects. As a result of the shortage in programs and activities, the local market has facilitated the emergence of companies with weak financial abilities and low credit facilities on the one hand, and low quality products that do not comply with international IT standards on the other.

As seen in figure (10.3), only five IT companies, from the sample of 107 companies approached, have quality certification such as ISO 9000, Software Engineering Institute–Capability Maturity Model (SEI-CMM) or the like. In general Jordanian IT companies adopt a negative attitude regarding quality certification (see figure 10.4).

However, to name a few positive trends as well, there are emerging initiatives in the cluster at hand that consider building connections with universities through an approach known as the Technology Pilot Program (TPP).¹

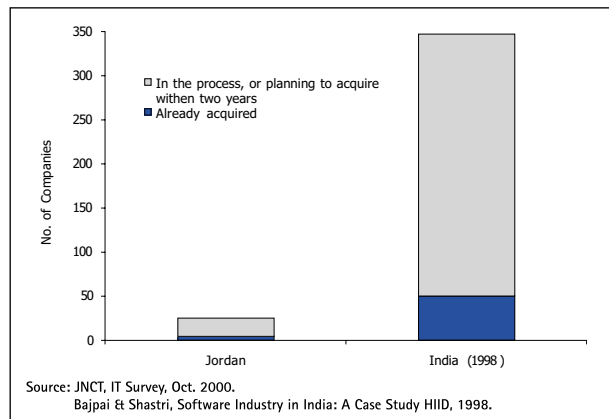


Figure 10.3: Quality Certification in Jordan and India

Such an initiative is needed to bridge the gap between university outputs and market needs. To quote one owner and administrator of a local IT company, "university courses are more academic than practical. They are not tailored to meet sector needs, thus explaining why the role of universities is decreasing compared to the role of training institutions." In contrast, a professor in computer science asserted that following a purely practical approach rather than an academic one would limit the student's ability to create and innovate. Nevertheless, the educational system provides a limited number and quite often weakly structured courses within the ICT and IT

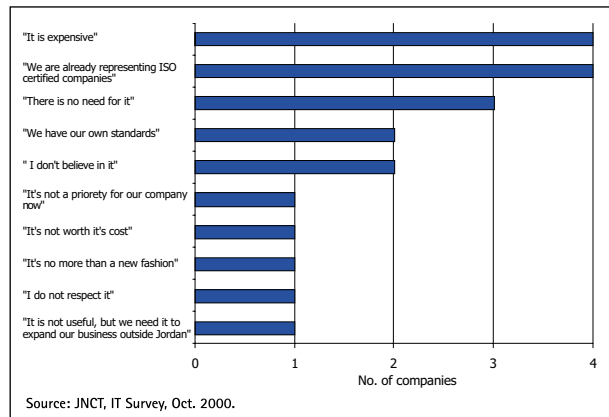
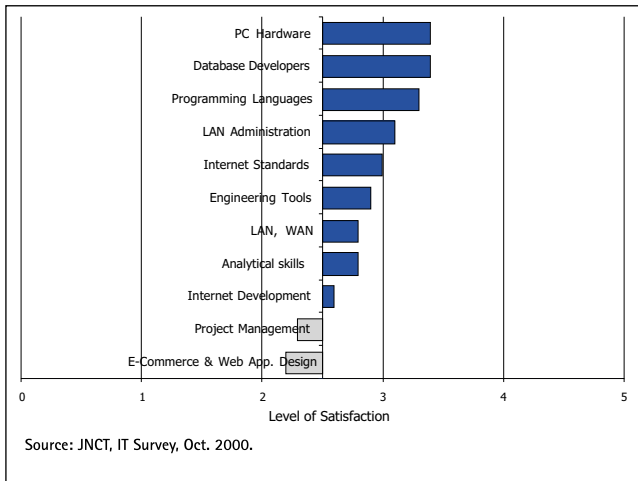


Figure 10.4: Attitudes Towards ISO Certification

¹ The Technology Pilot Program aims at enhancing both qualitatively and quantitatively the status quo of IT graduates through productive relations between Education and Industry.

Figure 10.5: Knowledge Assessment of Graduates from Jordanian Universities (1-5)

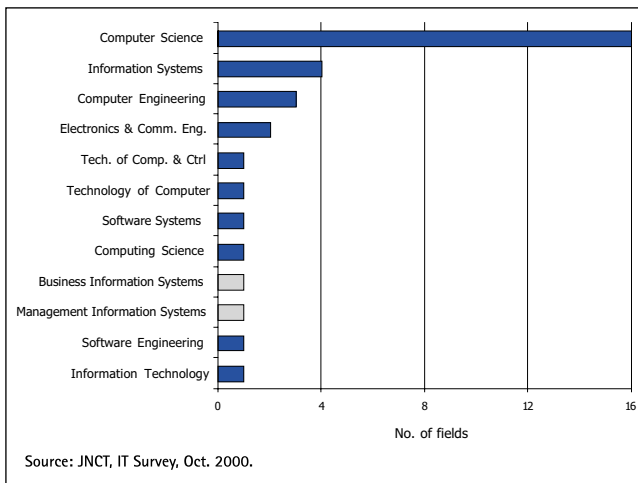


related faculties. (See figure 10.5) Besides the most common section, computer science, the higher education entities in Jordan schedule ordinary, flat courses in supporting skills such as management. (See figure 10.6)

Moreover, in spite of the fact that 74% of the universities claim cooperation with IT companies, the only form of cooperation lies in the training they may provide to students. Any collaboration aimed at developing local production or university curriculums is rare or barely notable.

With regard to IT consultancy services, the survey reveals that such services are in general weak and underdeveloped. In most cases, such services are free and often provided by the producer as part and parcel of the sale. Therefore, they are essentially meant to support sales, which benefit the producer directly, rather than meet the true requirements employed by the development and upgrading of IT systems in the IT market. In due course, this unfortunate state of affairs has led to the discontent of all clients, and among others the government itself, investing in outsourced IT systems. As a result, half of the surveyed sample of governmental institutions approached voiced their dissatisfaction with the IT systems installed by various IT companies. 50% of the

Figure 10.6: Fields of Specialization in Jordanian IT Related Faculties



IT systems sold to the government are developed in-house. This condition triggered a significant decrease in the demand for consultancy services, forcing some IT consultancy companies out of business.

Nevertheless, the role of the government in maintaining local IT consultancy services in such a deficient condition should not be neglected. To be precise, the government practices the so-called "lowest best bid system" when outsourcing IT systems. This is a very tedious process resulting in the employment of the services of the IT company that bids the lowest prices. As such, quality is disregarded in favor of involved costs, and only those IT companies that are most competitive price-wise win government tenders in general. Hence, governmental institutions usually acquire unsatisfactory systems equipped with poor applications and IT solutions.

Another major hindrance posed by the government in the IT sector concerns customs. In many cases Jordanian IT companies that develop various programs and software have their products sent to Europe and the USA for copying. Yet the copies of the same programs are subject to import taxes when sent back to Jordan. This way the operation costs the local IT companies too high a price to make programming sustainable.

Another negative factor affecting the present business environment of this cluster is the presence of monopolies in the Telecommunications sector. Jordan Telecom for example is to retain its monopoly in the sector until 2004. So far, its monopolistic position in the market has maintained and proliferated the relatively inadequate, expensive telecommunication infrastructure. To endorse such an assumption, figure (10.7) exhibits the statistics of Internet users in Jordan vis-à-vis other Arab countries in the region.

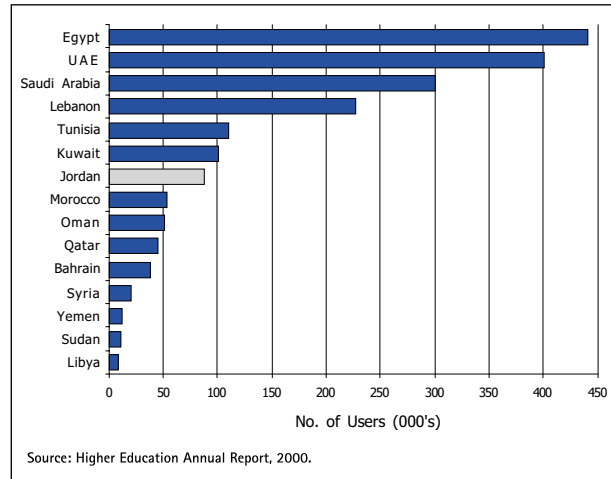


Figure 10.7: Internet Penetration in the Arab World, 2000

Nevertheless, due to recent efforts made by Jordan Telecom and other stakeholders, telecommunication services have been revamped both in terms of cost and quality.

The analysis of the business environment of the cluster at hand reveals the fact that IT companies are confronted with two alternatives. The first one is to work in a new business environment, as suggested by four of the sampled companies. The second, and more realistic one is to fully utilize the comparative advantages that Jordan enjoys, particularly those concerning work conditions, and move ahead to satisfy the international demand. In brief these advantages are the following:

- Fair "arabizing" skills
- High percentage of English speakers
- Acceptable number of university graduates in the field of IT (1200/year)
- An acceptable number of IT graduates from the West

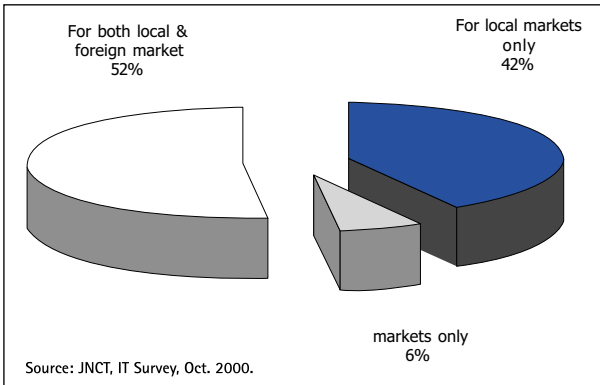
As a result, though only 45 companies representing 42% of the surveyed sample target the local market, some IT companies have turned to external markets. Seven companies from the surveyed sample, the equivalent of 6%, were established solely to produce for foreign markets. To the same extent, the largest segment, 56 companies (the equivalent to 52% of the surveyed sample) produce for the local and foreign markets simultaneously. Both groups, as shown in figure (10.8), export primarily to the Gulf States followed by the US and Europe.

To be specific, the total size of exports for the year 1999 was US\$ 60 million, which is 47% of total sales for that cluster. Jordanian IT exports consist mostly of software packages, various systems and applications, as well

as hardware devices such as mini-computers. They also include numerous support activities and consultancy services. However, despite the wide range of exports noted in the surveyed sample, only 15 companies out of the sample set make use of e-commerce tools while exporting their services.

Nevertheless there is still a huge gap between the export volume of Jordanian IT products and that of other countries, in particular Israel. If reference is made to the year 1999, Israeli exports reached US\$ 2000 million, but Jordan did not meet this performance.

Figure 10.8: Number of ICT Companies Selling to Foreign Markets



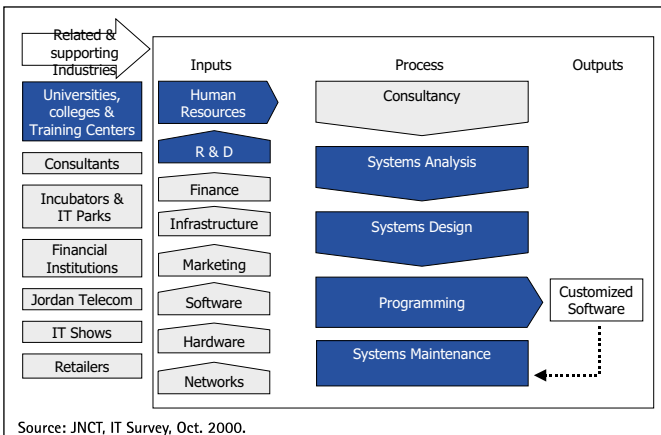
According to the survey, Israel owes its achievement to the effectiveness and efficiency of the IT sector in promptly meeting the continuously changing demand of the IT market. As such, it was able to successfully access external markets and satisfy the increasingly sophisticated demand of the ICT market. In conclusion, to maximize the emerging external demand for Jordanian IT products and boost exports, the IT sector in Jordan needs to acknowledge there is room for improvement.

The IT related businesses should partake in more daring initiatives since the IT cluster is a top priority on the governmental agenda, and the sector has the privilege of steady support. In line with the special regime enjoyed by the IT cluster, a lot of progress has been made on the ground. As such, censorship on programs and software has been removed, and due amendments have been implemented on tariff exemptions and the IPRs Law (copyrights, trademarks, patents and trade secrets). Additionally, the Investment Promotion Law has been adjusted to match the emerging requirements of the IT industry.

IT supporting industries and related businesses play a crucial role in ameliorating the performance of the cluster. In an attempt to estimate their impact, the survey looks closely into several IT related fields. The educational system for instance, which has a direct bearing on the development of human resources, is by far the area with the most obvious impact on the competitive performance of the IT sector.

Other related activities that affect a company's financial abilities include consultancy in the production process, financial institutions and incubators. Jordan Telecom affects the infrastructure as previously explained, whereas IT shows, and exhibitions stimulate, marketing abilities. This is clarified in figure (10.9) presenting the cluster map of the software industry.

Figure 10.9: ICT Cluster Map



In an attempt to assess the current educational system in Jordan in relation to the IT sector, another study was conducted. The outcome emphasized the following particularities:

- 74% of the lecturers at IT related faculties in Jordanian universities are Ph.D. holders, which is an acceptable figure.
- 56% of the Ph.D. holders are graduates from western universities.
- 65% of the Ph.D. holders graduated after 1990. This means educational staff is young.
- 76% of the Ph.D. holders are Jordanians, representing more than half of the educational staff.

With regard to infrastructure, the survey revealed that 75% of the computers available to students (amounting to 4800 computers) are connected to the Internet. Additionally, 92% of the computers (306 computers in total) allocated to lecturers are also connected to the Internet. This indicates an acceptable state of infrastructure. Moreover it shows that in the Jordanian universities such key elements as infrastructure and teaching staff members are in a position to provide sophisticated academic outputs.

However, the investigation of the current curricula in Jordanian IT faculties highlights the discrepancy between academia and industry needs. (See figure 10.10) In the case of programming languages the survey shows that Oracle is compulsory in half of the number of the Jordanian universities subjected to the survey. HTML is compulsory in just 20% of the IT faculties. Nevertheless, the interviews conducted at the same universities reveal that 52% of the sampled faculties review their curricula on an annual basis. Furthermore, the interviews stress the fact that every lecturer is responsible for staying updated with developments in the IT sector, and improving the curricula accordingly. In addition lecturers are obliged to ensure that the latest information attained is properly transferred to students.

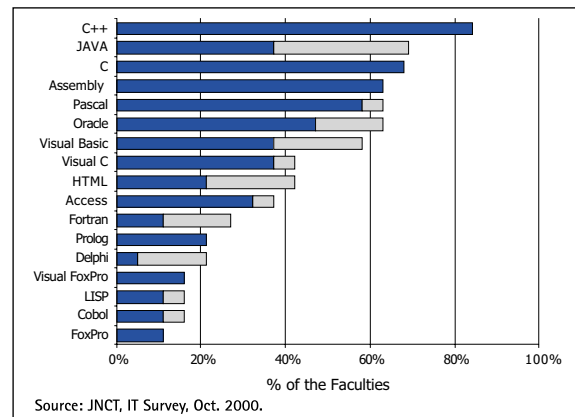


Figure 10.10: Programming Languages in Jordanian IT Faculties

Nonetheless, the role of the educational system, and academia in general, goes beyond the immediate support extended to the industry at hand. It has a major impact on the rate of employee turnover in the industry. The development of academia to meet industry needs means less training carried out by companies, and consequently a reduction in the rate of turnover. According to the survey, the rate of employee turnover is 26% in small sized companies, 16% in medium sized companies and 9% in large sized companies, even though large companies do not necessarily offer higher wages than smaller sized companies. According to one IT consultant, "there is no one recipe for retaining employees or at least decrease the turnover rate. We can't say that Employee Share Ownership Plans (ESOP) is the best practice to follow, especially in Jordan where most people prefer cash incentives". Nevertheless, IT companies in Jordan can still adopt their own policies for retaining employees. They may award their employees with a challenging work environment whilst considering their financial, professional and social needs.

Box 10.3: International Practices in Reducing Employment Turnover

- Kraft Foods attributes its reduction in annual IT staff turnover to 5% to its focus on community building and personal development. The company encourages its employees to pursue education and training beyond technology, including areas such as business and finance.
- Sun Microsystems offers adoptive parents financial assistance of up to US\$ 2,000; lactation rooms for nursing mothers returning to work; a special day care center in the San Francisco Bay Area that accepts children with minor illnesses; a dependent care spending program; a consultation and referral program; and an employee assistance program that offers short-term professional counseling, as well as other benefits.

The digital workforce

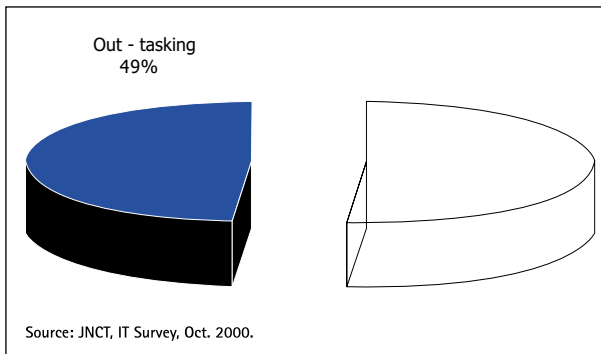
Future Strategy

Finally, we propose an analysis of the new trend in the Jordanian IT business environment whereby an increasing number of companies restructure their strategy to work as out-tasking providers for ICT companies in advanced countries, mainly the US.

In the first place, it is necessary to explore the demand for core IT occupations in the American market. The demand for systems analysts and programmers is particularly high in the USA. Besides, there is an increasing gap between systems analysts, computer scientists, computer engineers, and programmers. Factually the gap is expected to reach 1.3 million in 2006, in favor of systems analysts. This state of affairs is attributable to various reasons the most important of which is offshore contracting of code writing, otherwise known as out-tasking.

More precisely this means that as soon as the higher-level work involved in the software development is accomplished, the lower level coding work is broken down and distributed. This latter type of work is increasingly being outsourced to those regions of the world where costs are low. This trend was apparent during the IT Forum 2000, whereby approximately half of the participants sought out-tasking (subcontracting) partners. (See figure 10.11) However, this new trend may have serious implications on the development of the IT industry in Jordan as well as elsewhere in the world.

Figure 10.11: Jordan IT Forum: Types of Partners Sought by Jordanian IT Companies



According to our investigation, out-tasking in low value added operations would chiefly mean providing all IT related and supporting activities, and using the inputs of the production process to serve a small part of the production process, i.e. programming.

In such instances even the production of a high value added product does not benefit the development of the local IT industry. The local producer does not have any property rights over the product since it goes into the custody of the contracting company as soon as it is produced, which would be in the US in most cases. Finally, this may deepen the gap between the local economy and advanced economies since the competitive edge of low wages rather than knowledge and know-how will be prioritized. As such, though the out-tasking trend is attractive in terms of fast financial gains, in the long run it does not genuinely benefit the IT cluster and does not contribute to its development in any way.

In brief, it is advisable that the local IT cluster focuses on and specializes in a high value added segment of the market. However, in order to fully benefit from the higher value added feature, local IT companies should carry out the production process of the selected segment from A to Z, rather than take over just a part of it.

